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(54) Abstract Title

A first device reads an external code containing a second device's id and establishes a wireless connection if the id is found in a list stored within it

(57) When a wireless connection is to be formed between a PDA 1, for example, and a printer 11, for example, the user of the PDA 1 causes it to read a code 13, e.g. a barcode, from the printer 11 so that the PDA 1 can identify the printer 11 in a list 20 of discovered neighbouring devices and, consequently, send appropriate connection set up signals to the printer 11 rather than inadvertently to some other device.

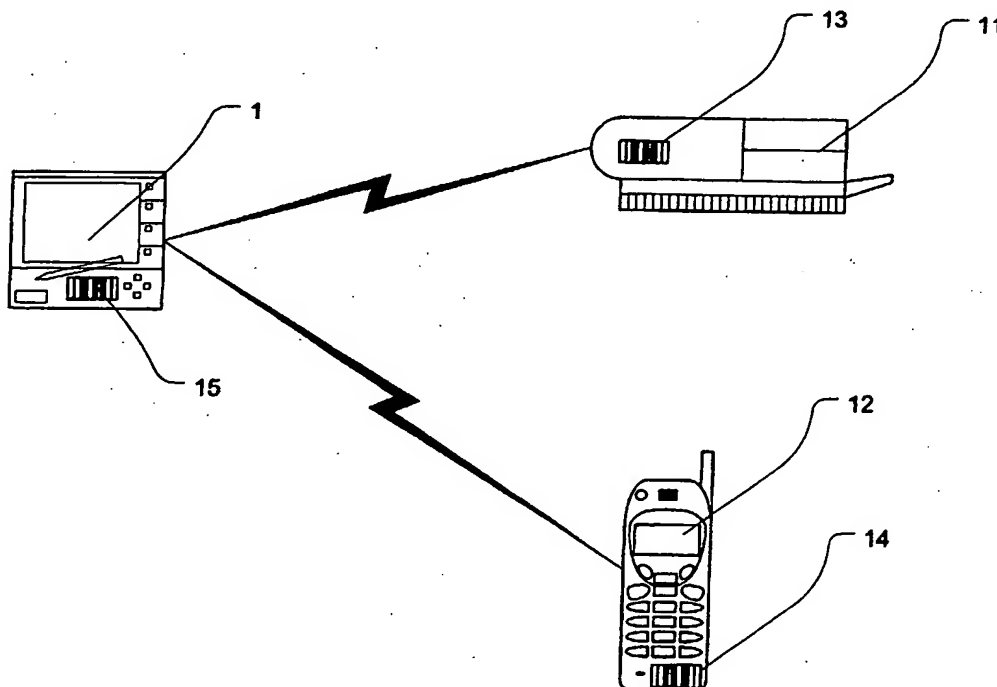


Figure 2

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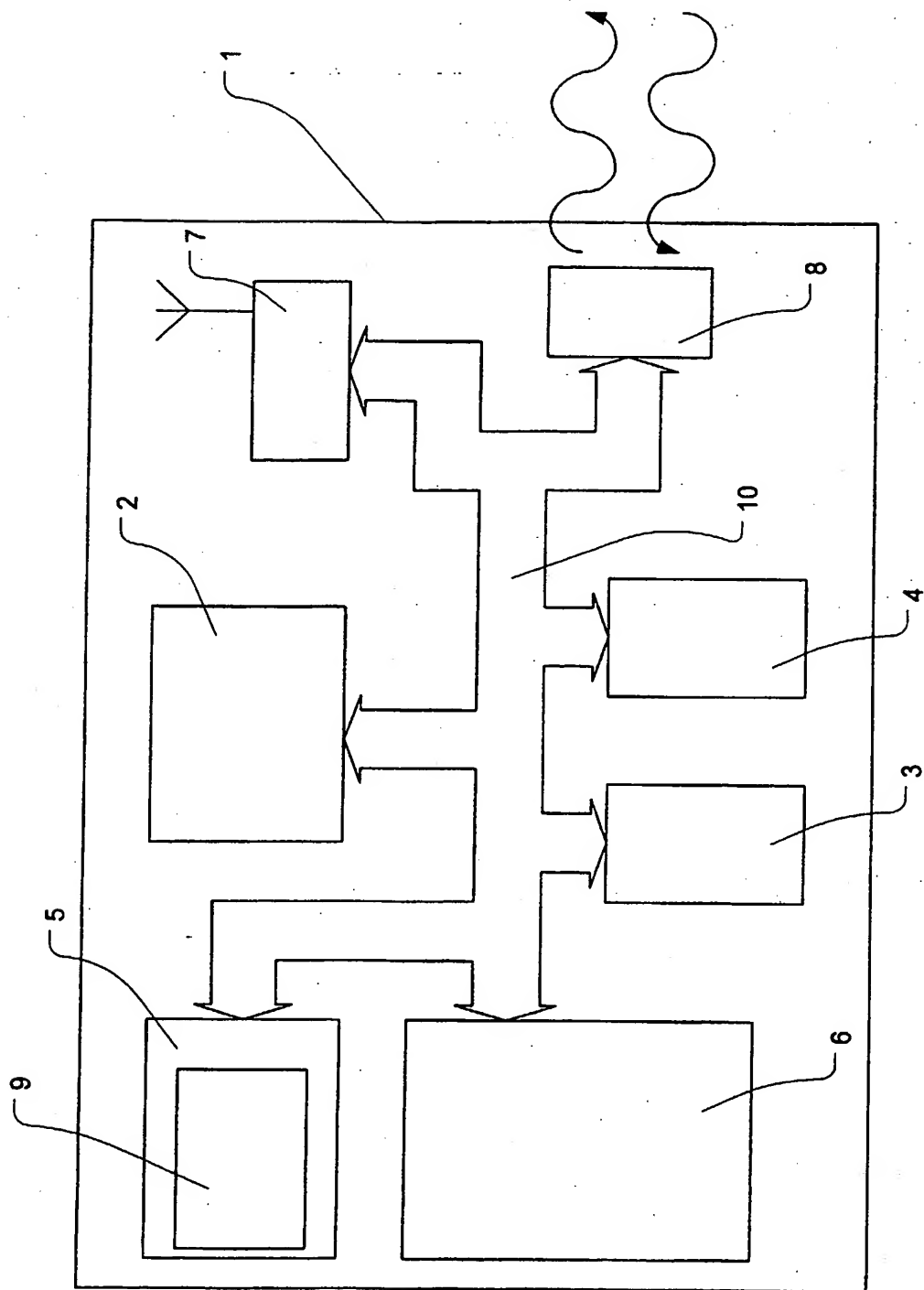


Figure 1

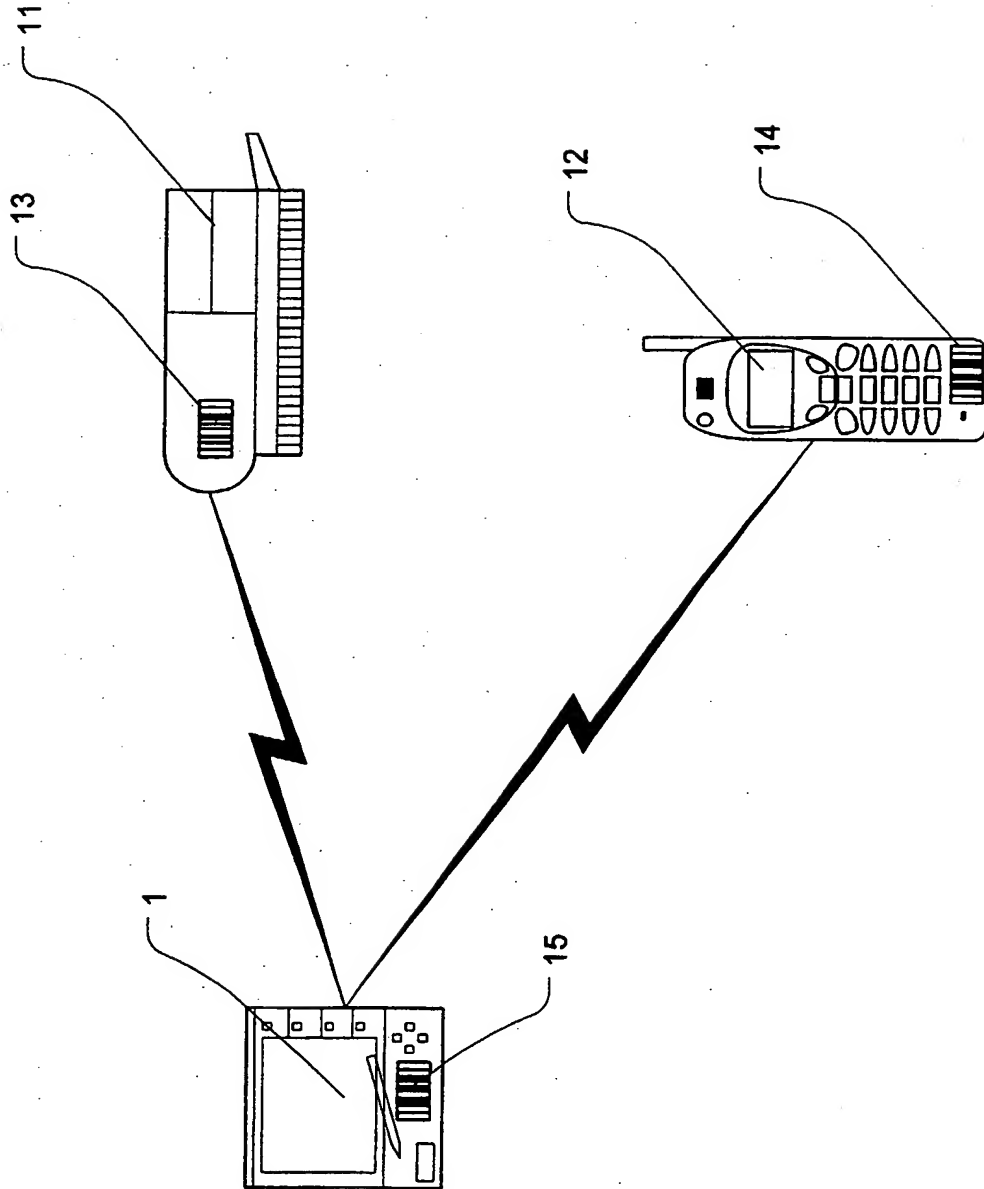


Figure 2

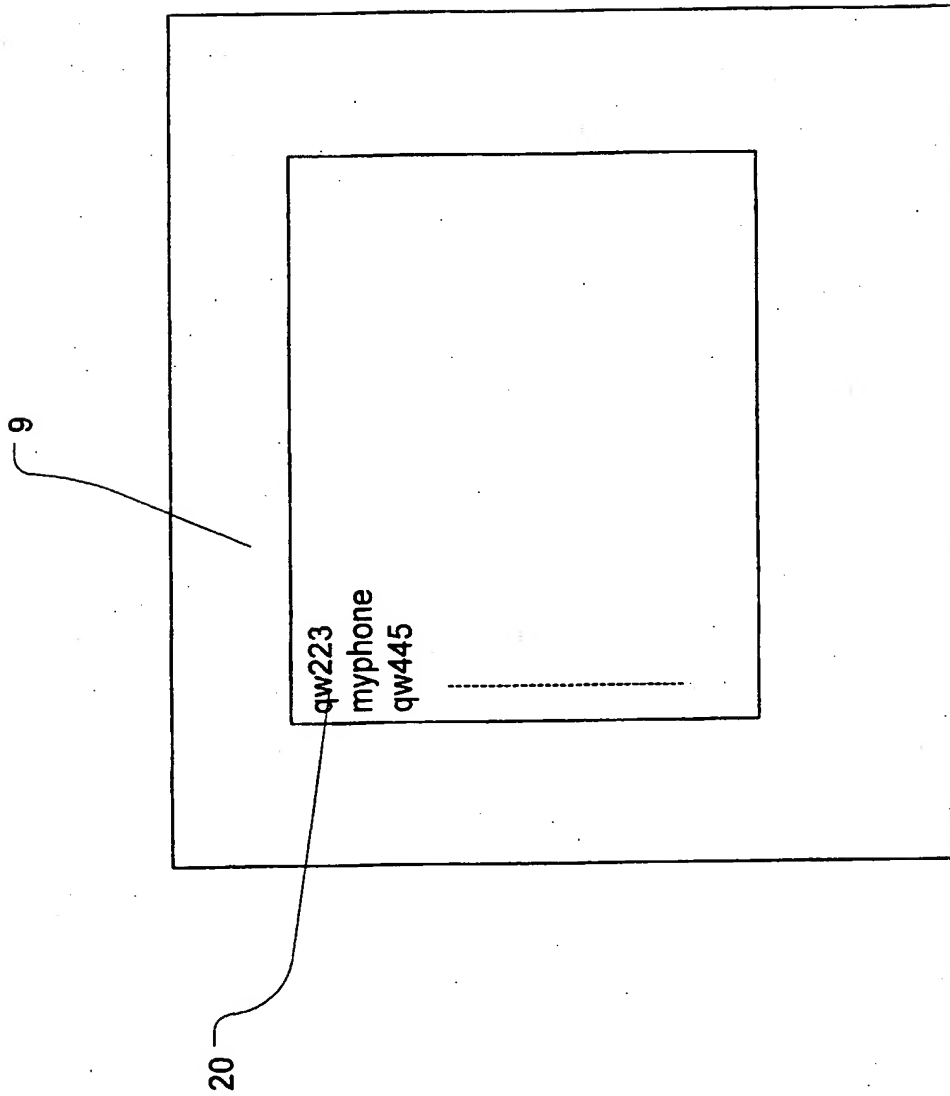


Figure 3

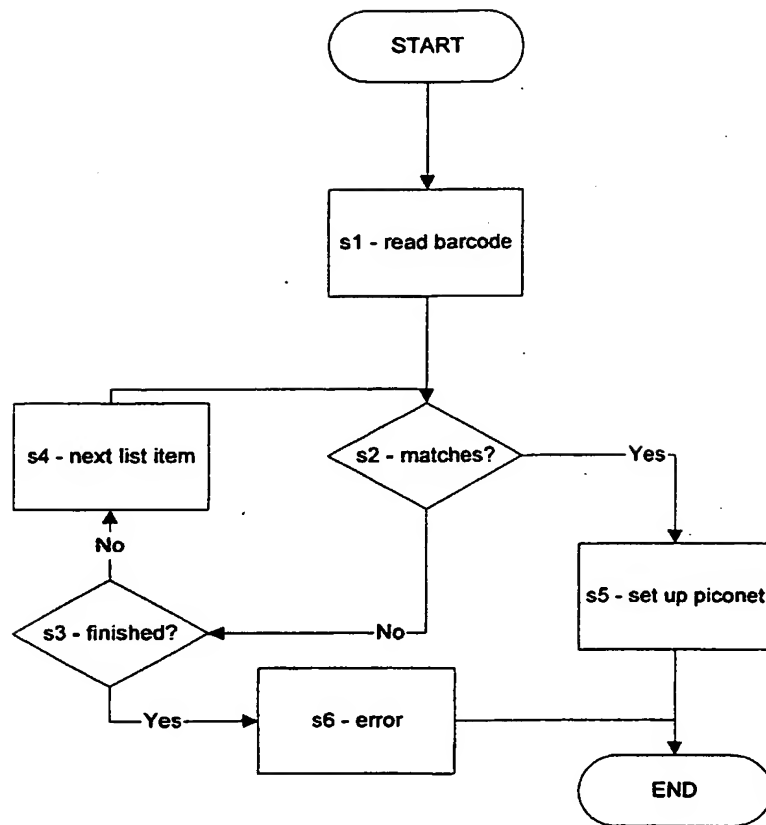


Figure 4

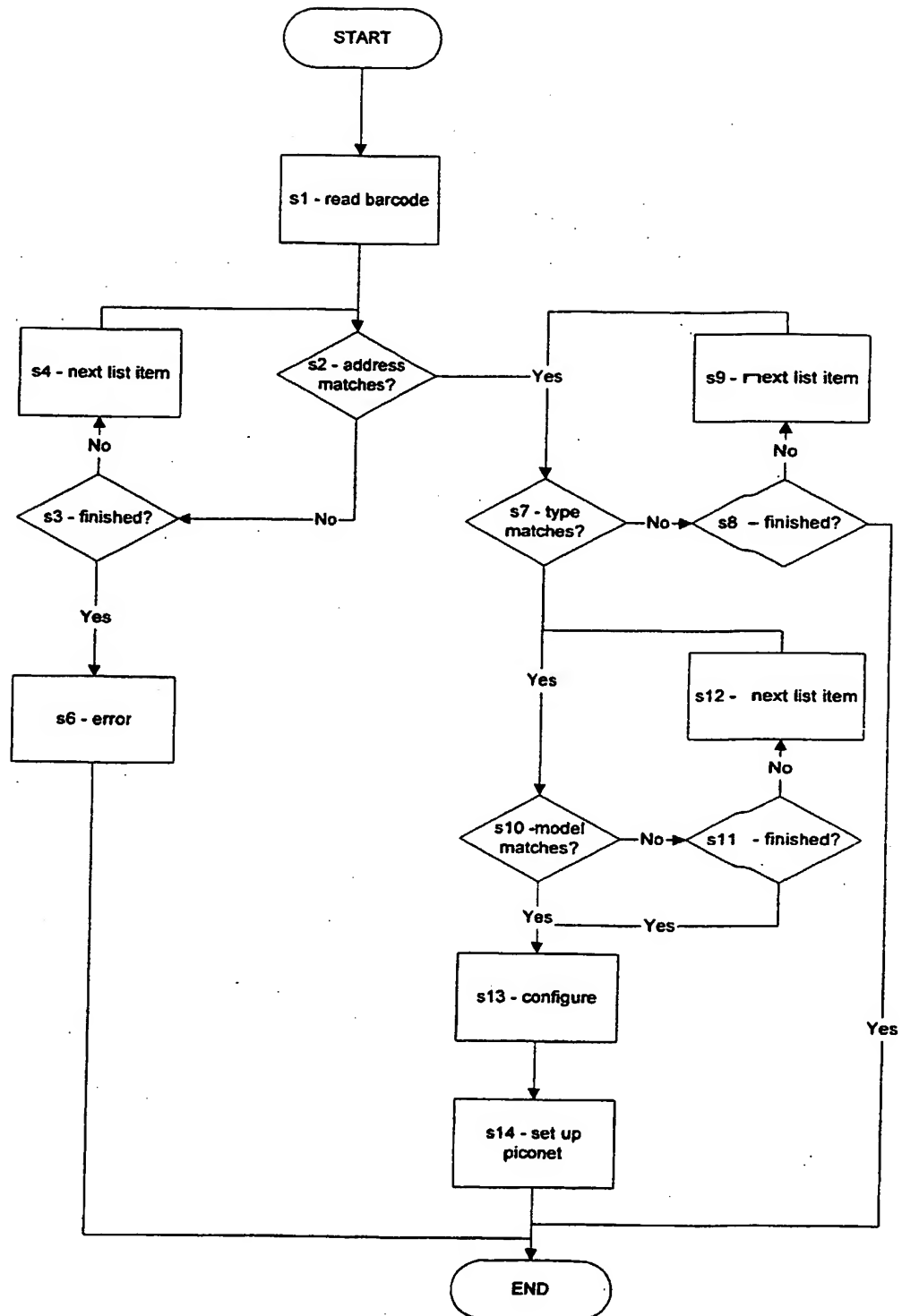


Figure 5

Wireless Communication

Description

The present invention relates to wireless communication.

5 Devices implementing the Bluetooth standard have recently begun to appear. Bluetooth provides a common standard by which devices, such as PDAs (Personal Digital Assistants), mobile phones, printers, etc., can communicate with each other wirelessly. Bluetooth uses radio signals in the 2.4 GHz Industrial-Scientific-Medical
10 band.

Bluetooth has a weakness in that problems arise in discovering an intended recipient for a communication in a crowded environment, such as a conference where many people are exchanging electronic business cards or on a commuter train where many
15 people have Bluetooth connections between mobile phone or music playing devices and ear phones. A Bluetooth device must perform a time-consuming discovery operation which will actually locate every Bluetooth device in the local environment. The user is then provided with a bewildering list of devices from which he must select the correct device. If is of course undesirable to try to send an electronic
20 business card to a stranger's MP3 player.

It is an aim of the present invention to solve the afore-mentioned problem of Bluetooth and similar systems.

25 According to the present invention, there is provided a method of establishing a wireless connection between two devices, the method comprising storing in a first device a list of ids of connectable devices, using the first device to read an external code from a second device, selecting an id from said list in dependence on said read code and sending connection establishing signals to the second device in response
30 to said selection.

According to the present invention, there is also provided a device including code reading means, wireless communication means and processing means programmed to cause the device to perform a method according to the present invention.

5 According to the present invention, there is further provided a device including wireless communication means, processing means for controlling the wireless communication means for wireless networking with other devices, a memory storing a device id and an external code corresponding to said device id.

10 The code is conveniently an optical barcode. It should be appreciated that the term "code" used herein does not exclude markings that are intelligible to humans. For instance, a human can easily learn to read a written representation of Baudot code, which was of course designed for machine-to-machine communication.

15 The code need not be permanently readable. For instance, the code may be a pattern produced on an LCD which would disappear in the event of the device bearing it being switched off or becoming inoperative due to a failure.

Advantageously, the code includes a device type identifying part. This can be used
20 for automatically configuring the first device.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which: -

Figure 1 is a block diagram of a device according to the present invention;

25 Figure 2 illustrates a piconet;

Figure 3 shows the display of the device of Figure 1 during connection to another device;

Figure 4 is a flowchart illustrating the device of Figure 1 operating according to the present invention; and

30 Figure 5 is a flowchart illustrating the operation of a second device according to the present invention.

Referring to Figure 1, an electronic device 1, which may be a PDA, a mobile phone, or other device, comprises a processor 2, RAM 3, ROM 4, display circuitry 5 including a display 9, user input circuitry 6, an rf subsystem 7 and a barcode reader subsystem 8 interconnected by a bus 10. The device 1 may have additional circuits and mechanical elements (not shown) which are required for its particular function, e.g. signal processing in the case of a mobile phone and a printing engine in the case of a printer.

The ROM 4 contains Bluetooth routines for controlling communication using the rf subsystem 7 which are accessible to programs being run by the processor 2 via an API.

The rf subsystem 7 comprises transceiver circuitry, including a local oscillator, and a controller for controlling the transceiver circuitry in response to commands from the processor 2. The transceiver is adapted for frequency hopping transmission and reception according to the Bluetooth specification.

Referring to Figure 2, the device 1 can connect with other Bluetooth enabled devices, in this case a printer 11 and a mobile phone 12 to form a "piconet". The printer 11, the mobile phone 12 and the device 1 have respective barcodes 13, 14, 15 on their outer surface. The bar codes 13, 14, 15 represent the Bluetooth Device Addresses for the printer 11, the mobile phone 12 respectively and the device 1.

Bluetooth devices perform a discovery operation to locate other Bluetooth devices in their neighbourhood and add discovered devices to an internally stored list.

Referring to Figure 3, when the user of the device 1, which is a PDA in this case, wishes to print using the printer 11, the user is presented by the PDA with a list of the Bluetooth Device Addresses of discovered Bluetooth devices on the display 9. If the user knows the Bluetooth Device Addresses of the printer 11, the user can manually select the appropriate entry in the list so that the device 1 can form a piconet with the printer 11.

Referring to Figure 4, if the user does not know the Bluetooth Device Address of the printer 11, the user can approach the printer 11 and using software in the ROM 4 activate the barcode reader subsystem 8 to read the barcode 13 from the printer 11 (step s1). The device's processor 2 then searches the members of the list 20 for
5 a match (steps s2, s3 and s4) and, if one is found (step s2), sets up a piconet connection with the device identified by the match, i.e. the printer 11 (step s5) by sending connection establishing signals to the printer 11. If a match is not found in the list, an error is signalled to the user (step s6).

10 Barcodes have been given in the foregoing as an example of machine-readable indicia. It will be appreciated that other forms of optically readable codes or symbols and magnetic codes could be used.

It will be appreciated that the list 20 need not be displayed and that codes may be
15 read from devices whenever a connection is required to be established.

In a second embodiment, the barcode is extended to include a device id code, comprising a type part and a model part. For instance, the barcode 13 on the printer 11 would comprise the printer's Bluetooth Device Address and a code
20 identifying it as a printer of "Thingamyjig 2000" type. The code identifying the device type can then be used by the connecting device 1 to configure itself, e.g. selecting the appropriate driver for the printer being connected to. Another example, would be to start appropriate processing software. For example, a code identifying a device as a video camera would cause the device reading the code to
25 start video display software in preparation for receiving video signals from the camera.

Referring to Figure 5, the process of finding the Bluetooth Device Address from the barcode in the list 20 (steps s1 to s6) are the same as in the previous embodiment.
30 However, if the Bluetooth Device Address is found in the list 20, the connecting device's processor 2 searches (steps s7, s8 and s9) an internally stored list of device type codes for a match with that from the barcode. If no match is found (step s8) the process is exited. However, if a match is found (step s7), the processor 2

searches (steps s10, s11 and s12) a list of known models of devices of the identified type. If a match is found (step s10) or no match is found (step s11), the process moves onto a configuration step (step s13). In the configuration step, the processor 2 identifies any device type and, if relevant, model specific actions to be performed, e.g. driver selection or application program execution, and performs these actions. Following the start of step s13, the processor 2 proceeds to set up the piconet connection (step s14).

I will be appreciated that many modifications may be made to the embodiments described above.

Claims

1. A method of establishing a wireless connection between two devices, the method comprising:-

5 storing in a first device a list of ids of connectable devices;
using the first device to read an external code from a second device;
selecting an id from said list in dependence on said read code; and
sending connection establishing signals to the second device in response to
said selection.

10 2. A method according to claim 1, wherein said code is an optical barcode.

3. A method according to claim 1 or 2, wherein said code includes a device type
identifying part.

15 4. A method according to claim 3, including automatically configuring the first
device in dependence on said device type identifying part.

20 5. A device including code reading means, wireless communication means and
processing means programmed to cause the device to perform a method according
any one of claims 1 to 4.

25 6. A device according to claim 5, wherein the code reading means comprises
barcode reading means.

7. A device including wireless communication means, processing means for
controlling the wireless communication means for wireless networking with other
devices, a memory storing a device id and an external code corresponding to said
device id.

30 8. A device according to claim 7, wherein the externally accessible code is an
optically readable barcode.

9. A device according to claim 7 or 8, said code includes a device type identifying part.

10. A method of establishing a wireless connection between two devices, the method being substantially as hereinbefore described.

11. A device substantially as hereinbefore described with reference to Figures 1, 3 and 4 of the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0018237.8
Claims searched: 1-9

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Examiner: Hannah Sylvester
Date of search: 5 February 2001

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): H4L (LESF, LED, LECTS, LECCX, LEF, LRPRD)

Int Cl (Ed.7): H04B 1/38, 1/40, 5/02, 7/26, H04M 1/26, 1/276, 1/57, 1/725, 1/72, 1/727,
3/42 7/16, 11/00, H04Q 7/62, 7/04, 3/62

Other: Online: WPI EPODOC JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	JP8307539A (MITSUBISHI)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.